Update on Eyewear Fog Tester Apparatus: APBI 2011

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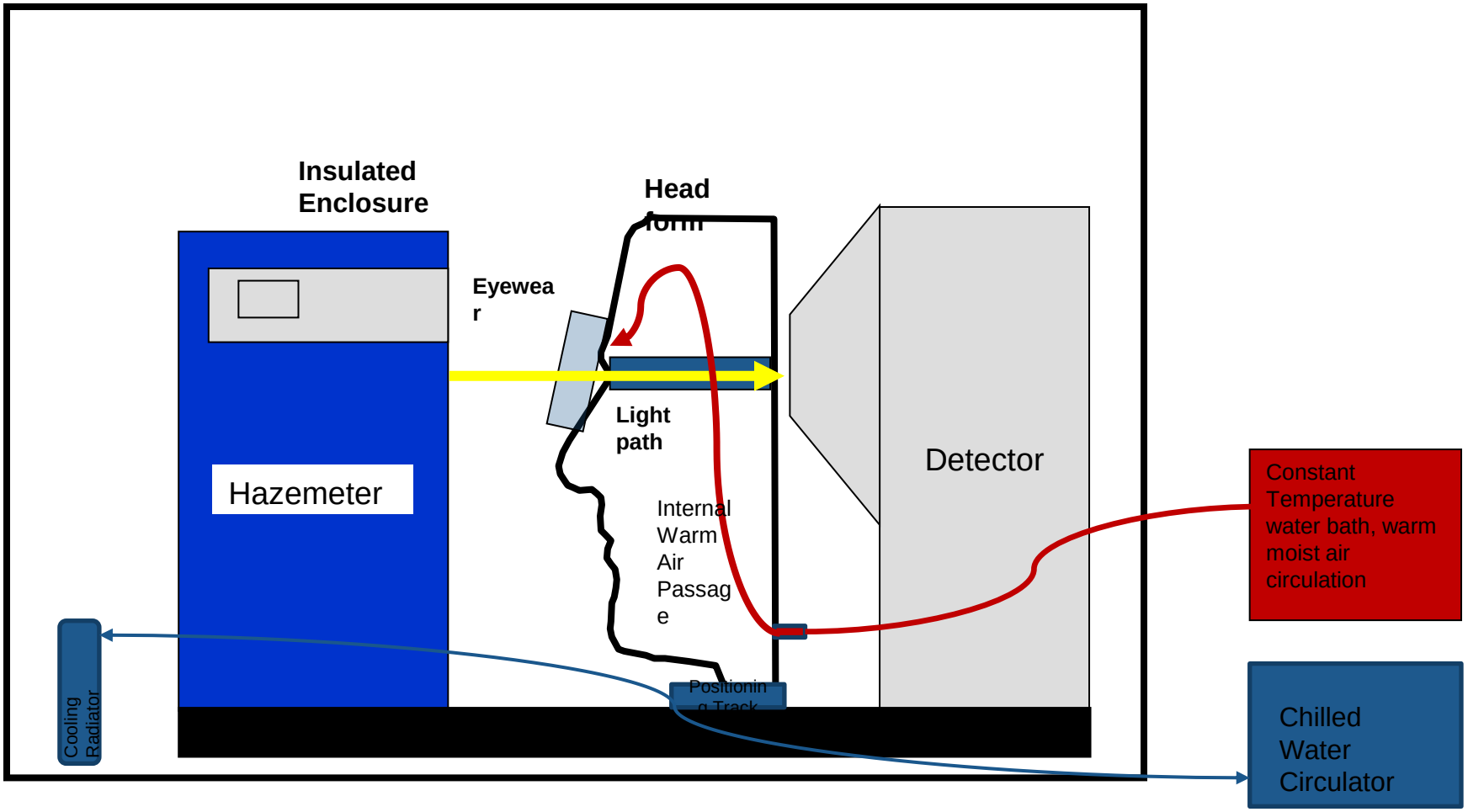
Eyewear Fog Tester Apparatus

- Protective eyewear is required to prevent eye injuries and to reduce solar glare
- Under heavy exertion, condensation (fogging) can form inside protective eyewear, obscuring Warfighter vision
- Anti-fog coatings are required for goggles, but not for spectacles or prescription inserts
- There exists no widely-established test method for quantitative/performance based assessment of anti-fog coatings
  - ASTM F-659-06 Annex A1: Scope limited to ski goggles
  - EN 168:2001 *Personal Eye Protection* only partially covers subject topic
- Efforts have been made by NSRDEC for the Product Manager Soldier Protective Equipment (PM-SPE) to create standardized test platform for the Army to evaluate the performance of anti-fog coated eyewear
- Empirical measurements of delta haze can be used to determine effectiveness of anti-fog coatings under condensation-inducing conditions and improve the safety of the Warfighter

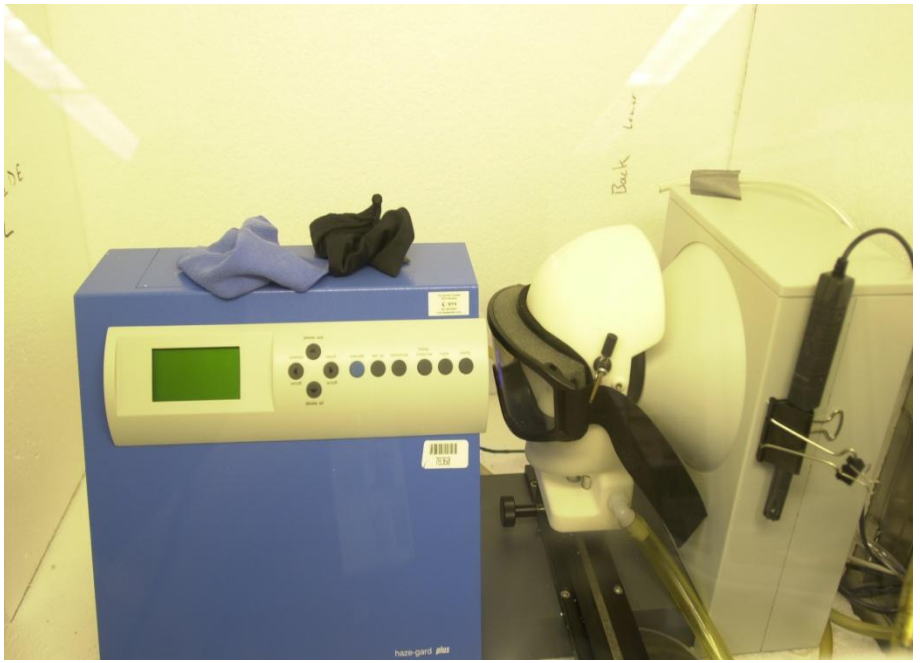
Eyewear Fog Tester Apparatus

- NSRDEC designed Fog Tester Apparatus
  - Suitable for testing Spectacles and Goggles
  - 2nd Generation head form uses EN 168:2001 *Personal Eye Protection* Medium head form for adult male 50th percentile dimensions for uniformity with other standardized testing requirements
  - Will be transitioning to a 3rd generation whole head form to expand testing capability to enable testing of gasmasks and other items, and measure effects of helmet and other items on "system" effectiveness of eyewear designs

Eyewear Fog Tester Apparatus

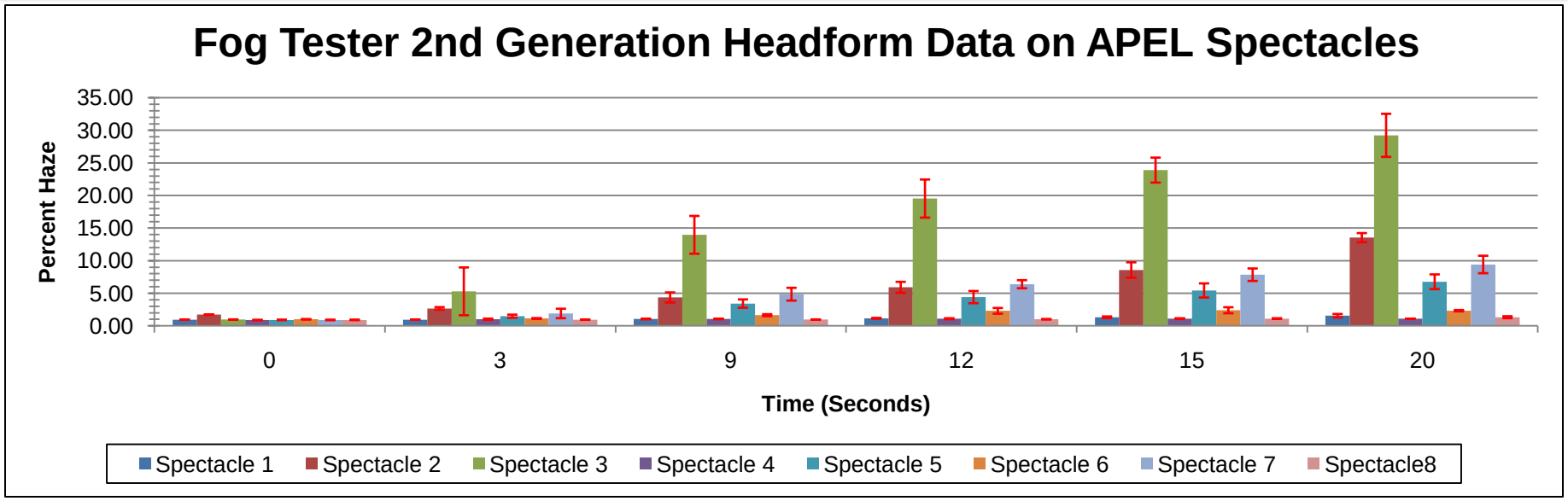


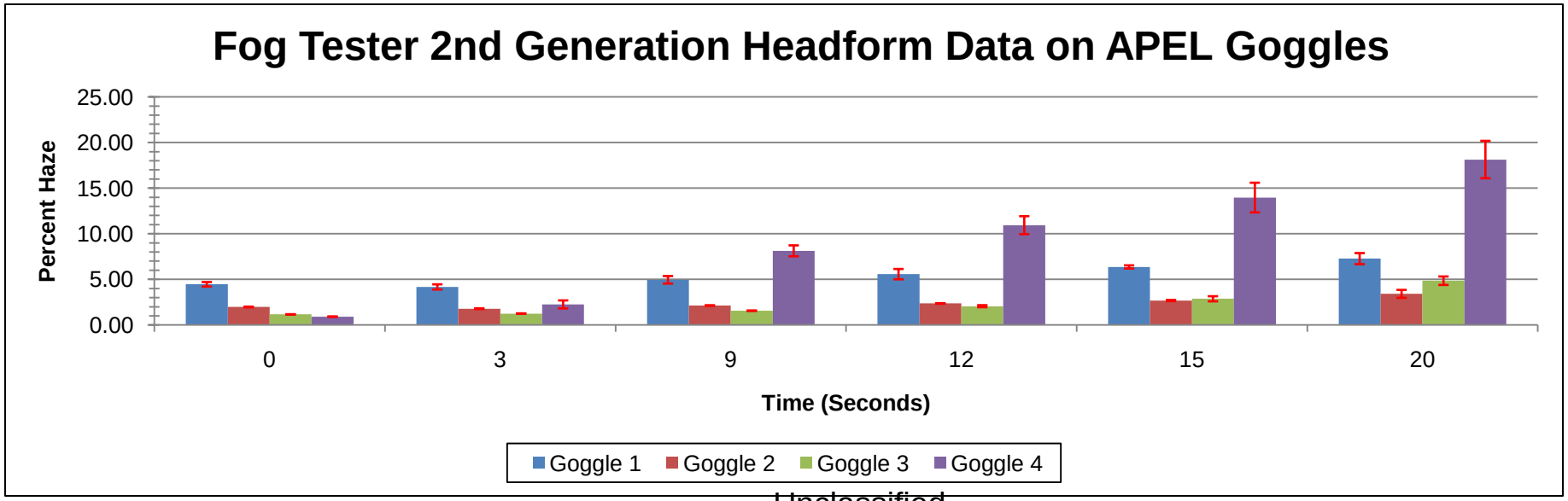
Eyewear Fog Tester Apparatus



Fog Tester with current 2nd Generation head form in test position with spectacles and goggles

Eyewear Fog Tester Apparatus





Eyewear Fog Tester Apparatus

- NSRDEC currently involved in Cooperative Research and Development Agreements (CRADA) with eyewear manufacturers
  - Interested in feedback on design and test usability
  - Eyewear Industrial partners gain access to unique test equipment, help guide potential test standard

Eyewear Fog Tester Apparatus

- Initial CRADA feedback
  - Identified several areas for instrument improvement
    - Need additional data collection points: temperature and humidity
    - Improve warm moist-air delivery setup
    - Need to heat glass eyelet in head form to prevent fogging during tests and giving false values
  - Overall design is well liked and potentially very useful
  - Will compile suggested design modifications and incorporate as necessary

Eyewear Fog Tester Apparatus

- NSRDEC has begun participating with ASTM International on test methods for analyzing resistance to fogging on eyewear, in the F08 committee
- ASTM Task Group meeting is scheduled for 18th May 2011 at the May Committee Week in Anaheim, CA.

Eyewear Fog Tester Apparatus

- CRADA work scheduled to end in August
  - Compile recommended design changes
  - Modify Fog Tester Apparatus
- ASTM test method work
  - Schedule to be determined by ASTM Task Group

Eyewear Fog Tester Apparatus

- Acknowledgements
  - Brian Kimball, NSRDEC
    - SAVE Project funding
  - PM-SPE: Michelle Markey, David Phelps
    - Initial project funding and design guidance